

the refined product of which is sold in China and India. The oil was until recently carried down the Irawadi in barges to the refineries at Rangoon; but a steel pipe ten inches in diameter and 297 miles long has been recently laid.

An oil-field occurs in Beluchistan and Persia in rocks of the same age as those of Burmah, but the geological conditions are unfavourable to the collection of the oil in natural underground reservoirs, and thus the western field has remained unimportant.

This valuable guide to the mineral fields of India closes with a summary of the mining laws, a bibliography, a full index, and three sketch-maps that show the distribution of oil in Burmah and of the metallic and earthy minerals throughout the Indian Empire.

J. W. G.

COTTON GROWING IN THE WEST INDIES.¹

THE history of the modern cotton industry of the West Indies forms one of the most interesting chapters in the history of agriculture. When cotton was re-introduced some six years ago it was practically a new crop to all concerned. Managers of estates had to learn the methods of cultivation and management, and labourers had to be trained. The manurial requirements of the crop required to be studied, and insect and fungoid pests had to be dealt with as they arose, to prevent them killing off the new crop. Thanks largely to the staff of the West Indian Agricultural Department, to the enterprise of the planters, and to the assistance of the British Cotton-growing Association, the crop has now become a very important one, and has been the means of improving considerably the financial position of many of these colonies.

The bulletin before us contains several important papers discussing the various phases of cotton production. Perhaps the most striking feature is the rapidity with which the industry has spread.

Cotton was first planted on a commercial scale in 1902, when about 400 acres were put into cultivation. In 1903 this area was extended to 4000 acres, in 1904 to 7000 acres, in 1905 to 9500, in 1906 to 14,500, and for the season 1907-8 20,000 acres are under culture in this crop. In addition there has been a general improvement in the quality of the lint produced since the plants have become acclimatised, and the planters have gained experience in the methods of cultivation and preparing the products. Mr. Thornton, in his general review of the progress of the industry, adduces evidence to show that further progress is possible; numerous points remain to be settled, and still greater improvements can be anticipated.

Mr. Sands's paper on the cultivation of Sea Island cotton at St. Vincent forms very pleasant reading. St. Vincent had been reduced to very bad straits. There had been a severe hurricane in 1893, and the terrible eruptions of the Soufrière in 1902-3. The unremunerative prices for arrowroot and sugar, the staple products of the island, made it impossible for the planters to retrieve their disasters. In 1903, however, the cultivation of Sea Island cotton was introduced by the Imperial Department of Agriculture, and has proved to be the means of restoring prosperity to the island; the revenue is now exceeding the expenditure, exports and imports are rising rapidly, estates are in full cultivation, and there is full employment for the peasant and labouring classes. The value of cotton exported for the year 1905-6 was 6059*l.*, for 1906-7 was 16,922*l.* The total value of the 1907-8 crop, in-

cluding exports, value of seed, &c., is estimated at 45,000*l.*

In St. Kitts cotton is grown almost entirely as an intermediate crop with sugar-cane. Up to the present no injurious effect on the sugar-cane has been noticed, and with careful manuring there seems little risk in continuing this system of planting. An agricultural inspector has been appointed to instruct the smaller growers in the best methods of working, and the prospects are considered highly satisfactory. In others of the Leeward Islands Dr. Watts has an equally satisfactory report to make; the exports from this group rose from 383,477*lb.* of lint in 1904-5 to 526,382*lb.* in 1905-6, and 702,910*lb.* in 1906-7, while a further increase is anticipated during the current season.

The Imperial Department is studying the question of seed selection, which promises to lead to still further improvement. The manurial requirements of the crop are being investigated, and schemes devised for dealing with the pests. Mr. Ballon gives a summary of his experiments on the cotton-worm, the boll-worm, cut-worms, the stainers and other pests; constant vigilance will obviously be necessary, but with a strong Department of Agriculture there is no reason to fear that the pests cannot be coped with. The progress of the industry reflects the greatest credit alike on the Department and on the planters, and augurs well for the future prosperity of the West Indies.

E. J. R.

NOTES.

SIR RICHARD D. POWELL has been re-elected president of the Royal College of Physicians of London.

MR. T. EDISON has been awarded the gold medal of the Royal Academy of Sciences of Sweden for his inventions in connection with the phonograph.

PRINCE ALBERT OF MONACO, distinguished for his researches in oceanography, has been elected a foreign member of the Paris Academy of Sciences in succession to the late Lord Kelvin.

THE summer meeting of the Institution of Mechanical Engineers will be held this year in Liverpool, and will begin on Monday, July 26.

THE Royal Physical Society of Edinburgh—one of the oldest scientific societies in the kingdom—has now opened its doors to women members. At the March meeting of the society, Mrs. Elizabeth Gray, Edinburgh, Miss Marion I. Newbiggin, D.Sc., Edinburgh, Mrs. Ogilvie Gordon, D.Sc., Ph.D., Aberdeen, and Miss Muriel Robertson, London, were elected ordinary fellows.

REUTER'S correspondent at Sydney reports that during a violent storm in the New Hebrides on March 29, Teouma was swept by a huge wave, which caused great destruction. The Government buildings at Vila were destroyed, and many vessels were stranded.

THE New York correspondent of the *Times* announces that Dr. W. H. Edwards died at Coalburo, West Virginia, on April 4, at the age of eighty-eight years. Dr. Edwards was the author of "The Butterflies of North America," a standard work on the subject, and contributed many papers on entomology to various scientific periodicals.

FROM Honolulu is reported the death, in his seventy-third year, of the Rev. Dr. Sereno E. Bishop, who had spent fifty-six years as an American missionary in the Hawaiian Islands. He was a frequent contributor to

¹ "West Indian Bulletin. The Journal of the Imperial Agricultural Department for the West Indies," vol. ix., No. 3, 1908.

scientific journals on subjects relating to volcanic action, and in 1883 he discovered the corona caused by the Krakatau eruption, since known in Europe as "Bishop's Ring."

A GENERAL meeting of the American Philosophical Society will be held in Philadelphia on April 22-24 inclusive. The preliminary programme includes particulars of forty-three papers, on a great variety of subjects, by distinguished American men of science. On the evening of April 23 a commemoration of the centenary of Charles Darwin's birth and the fiftieth anniversary of the "Origin of Species" will be held. Dr. James Bryce, British Ambassador at Washington, will speak on personal reminiscences of Darwin and the reception of the "Origin of Species." Prof. G. L. Goodale will give an address on the influence of Darwin on the physical sciences, and Prof. J. M. Baldwin will speak on Darwin's influence on the mental and moral sciences.

THE council of the Royal Geographical Society has resolved to award Lieut. Shackleton a special gold medal for his Antarctic work, and silver replicas to his fourteen companions who were with him throughout his expedition. With the approval of the King, the two Royal medals have been awarded to Dr. M. A. Stein, for his extensive archaeological and geographical explorations in Central Asia, and Colonel M. G. Talbot, for his extensive surveys on the North-West Frontier of India and in the Anglo-Egyptian Sudan. The Victoria research medal has been awarded to Prof. Alexander Agassiz. Other awards are:—the Murchison bequest, to Captain C. G. Rawling; the Gill memorial, to Commander B. Whitehouse; the Cuthbert Peek fund, to Captain R. Ommanney, R.E.; and the Back bequest to Rai Sahib Lal Singh.

REUTER'S Agency is informed that Dr. W. Bruce, of the Scottish Oceanographical Laboratory, has made more detailed plans of another Antarctic expedition to leave this country in 1911, the cost of which is estimated at 50,000*l.* It is proposed to carry on extensive oceanographical work in the South Atlantic Ocean between and south of Buenos Ayres and Cape Town, as well as in the Weddell and Biscoe Seas; to map the coast-line of Antarctica to the east and west of Coats Land, and to investigate the interior of Antarctica in that longitude. Part of the project includes a journey across the Antarctic continent, starting at some suitable base in the vicinity of Coats Land and emerging at McMurdo Bay, Victoria Land, or King Edward Land. The programme includes a circumpolar bathymetrical survey, especially in relation to the study of former Continental connections. Reuter's correspondent at Berlin announces that Mr. C. E. Borchgrevink will conduct a new expedition to South Polar regions some time during the summer. The expedition, the financial and other details of which have already been settled, has been arranged under the auspices of the International Polar Exploration Commission at Brussels.

CONTINUOUS efforts have been made by the Hampstead Scientific Society during the past year to find a suitable site for the establishment of a small astronomical observatory and meteorological station near the summit of Hampstead Heath. It is now proposed to rent, at a nominal charge, a portion of the top of the reservoir near the Whitestone Pond, to build there an observatory house, and to erect the 8-inch reflecting equatorial telescope presented to the society by Dr. F. Womack; also to establish on the same area a meteorological station. A sum of about 250*l.* will be required for the purpose of preparing the site, building the observatory house, and procuring the meteor-

ological instruments. An appeal has been made for donations to the fund being raised for this purpose. The report of the society for 1908, which has just been issued, shows that the society is doing good work to promote interest in science by means of lectures, classes, and field meetings. One of the honorary secretaries of the society is Mr. C. O. Bartrum, 12 Heath Mansions, Hampstead, N.W.

THE Lord Mayor presided at a large meeting held on Monday at the Mansion House in support of the objects of the Aërial League of the British Empire, "a non-political organisation to secure and maintain for the Empire the same supremacy in the air as it now enjoys on the sea." In a letter read to the meeting Lord Curzon said:—"While other countries have been perfecting their scientific and mechanical inventions we have accomplished little, and the popular inclination has been to regard the navigation of the air as a harmless but unpractical whim. This can no longer be said to be the case. Aviation has taken its place among the sciences, and whether it be regarded as a means of communication or as an instrument of warfare, it will undoubtedly admit of development in which nations as well as individuals will compete, and in which the superiority will rest with those who possess the greatest enterprise, resting upon a foundation of technical proficiency and scientific research." The speakers included Lord Montagu of Beaulieu, Dr. Hele-Shaw, Major B. F. S. Baden-Powell, and Sir Hiram Maxim, and the following resolution was carried unanimously:—"That this meeting of the citizens of London, held at the Mansion House, regards with considerable anxiety the rapid development of the science and practice of aërial navigation by other nations, and deplors the backwardness and apathy shown by this country regarding this new means of communication, which is of vital importance from a commercial as well as from a national defence point of view, and pledges itself hereby heartily to support the objects of the Aërial League of the British Empire."

ON April 1 Count Zeppelin's airship, carrying the Count, eight other passengers, and a crew from the Army Balloon Corps, accomplished a voyage of about 100 miles, from Friedrichshafen to Munich. According to the *Times* correspondent, the airship travelled along a considerable curve, and completed the voyage in five hours. As the airship approached Munich, a strong south-west wind prevented a landing upon the Oberwiesefeld, as had been arranged. The airship failed to make headway against the wind, and drifted with the wind to a place near Dingolfing, about forty miles from Munich, where a landing was effected. On April 2 Count Zeppelin sailed from Dingolfing about 11.30 a.m., and arrived at Munich shortly before 2 p.m., where a successful landing was effected. At 9 a.m. on April 5 the airship started upon another voyage; it returned to the balloon shed at Friedrichshafen at 7.30 p.m., after about 10½ hours' sailing, coming gently down in front of the shelter with perfect precision. From the Berlin correspondent of the *Westminster Gazette* we learn that, while Count Zeppelin has been practising with his reconstructed old airship, his newest, *Zeppelin II.*, has been nearly finished. Only some of the rudders and stability planes are lacking. The new ship is 136 metres long, 13 metres in diameter, and holds 15,000 cubic metres of gas. The aluminium frame is divided into cells, holding altogether seventeen separate balloonets, all except one being of rubbered cotton. The exception is made of English gold-beater's skin,

which is an experiment. There are two gondolas, each fitted with rubber buffers, to take up the shock when descending on dry land. The Daimler motors are those used in the former *Zeppelin II.*, destroyed last August, developing 110 horse-power. The gondolas are connected by a gangway, but there is no covered cabin, as in the former ship. The newest feature of *Zeppelin II.* is a vertical shaft going through the hull, equipped with a ladder, so that it is possible to reach easily the top of the hull and there to make observations of position.

THE relative size of the frontal lobe of the brain in the two sexes, in men of genius, and in the lower races has attracted the attention of many anatomists. The smaller frontal lobe in women and in negroes, and the larger in men of genius, would prove, it is believed, that this portion of the brain is the chief seat of a good mind. In the February number of the *American Journal of Anatomy* Prof. Franklin P. Mall, of Johns Hopkins University, brings forward evidence to show that no such unequal distribution of brain substance exists. The brain of woman, it is often stated, is of a simpler type than that of man; but if weight is not considered, it is questionable, says Prof. Mall, whether a collection of brains could be assorted according to sex with any degree of certainty. It is generally believed, also, that the brains of men of genius are of complex configuration, and those of lowly races of a simple type; but facts do not bear this out, and such statements are only misleading. Prof. Mall concludes that "arguments for difference due to race, sex, and genius will henceforth need to be based upon new data, really scientifically treated, and not on the older statements."

In its report for 1908 the Rugby School Natural History Society announces a change in the presidency, and likewise the appointment, for the first time, of vice-presidents. A gratifying increase in the number of associates is recorded, the names on the list now for the first time exceeding four hundred.

COCIDIANs inhabiting the intestine of a nemertine worm of the genus *Cerebratulus* form the subject of a paper, by Mr. S. Awerinzew, in vol. xxxix., part i., of the *Comptes rendus* of the St. Petersburg Academy. They are stated to present certain interesting features in their development.

THE birds and mammals collected during the Alexander Expedition to south-eastern Alaska in 1907 form the subject of a paper by Dr. J. Grinnell and others, issued as vol. v., No. 2, of the University of California Zoological Publications. The expedition was financed and headed by Miss A. M. Alexander, to whom the University is indebted for the gift of the large series of specimens collected. Several species and subspecies of mammals and birds are described as new, and notes on the habits of several species, especially beavers, are given.

To the first part of vol. xxxix. of Gegenbaur's *Morphologisches Jahrbuch* Mr. Carl Dilg, of Cologne, contributes an important paper on the post-embryonal development of the Amazonian manati (*Manatus inunguis*), together with notes, accompanied by maps, on the distribution of this species and *M. latirostris*, and of the Sirenia generally. The author's observations on the skull-structure apply in the main to the genus, and not specially to the Amazonian species. In the young the brain-chamber and the enclosing portion of the skull are elongated, and it is not until mature life that they attain the characteristic elongation. The foramen magnum is always oval, and not, as has been stated, round in *M. inunguis*. It does not seem possible to distinguish the sexes (*Geschlecht*) by the

dentition. The tympanic and petrosal do not fuse to form a petro-tympanic. The molars of *Manatus* resemble the milk-molars of Lydekker's *Prorasthomus veronense* of the European Oligocene. The dentition of the manatis is of a secondary type, so far as the exceptional number of cheek-teeth is concerned, while the extension of the skull in the line of the body-axis, the marked forward inclination of the orbital region, and the small orbits are all features indicative of adaptation to an aquatic life; the comparative lateness of this adaptation being indicated by the preservation of the original condition in the structure of the internal ear. The author agrees with Messrs. Thomas and Lydekker in regarding *Prorasthomus* as the ancestor of *Manatus*. As regards distribution, *M. inunguis* is now mainly confined to the Amazon basin, although it still survives in the Rio San Francisco; it was formerly met with for a considerable distance along the Brazilian coast. *M. latirostris*, on the other hand, is chiefly a Central American species, ranging but little south of the main stream of the Orinoco. For an undescribed Cretaceous sirenian from Pará the author proposes the name *Trachypleurotherium*.

AN account by Mr. C. K. Subba Rao of the cultivation in the Madras Presidency of the leguminous plant *Crotalaria juncea* is published as vol. iii., Bulletin No. 59, by the Department of Agriculture, Madras. The plant is grown either for the sake of the fibre known as sunnhemp or as a fodder crop. The fibre is chiefly used for weaving locally, but a certain amount is exported to the United Kingdom and Italy.

THE outstanding feature of the report for 1907-8 on the experiment station at Tortola, in the Virgin Islands, is the large increase in the cotton crop of the islands, shown by a rise in the export from fifty-one bales in 1907 to 162 bales in 1908. Good results have been obtained at the station with Liberian coffee, onions, cassava, and seedling sugar-canes; the report from London on a small quantity of cacao grown and cured locally indicates that there is an opening for an industry in this product.

THE annual report for 1908 of the Rothamsted Experimental Station contains a brief summary of salient features in the series of manurial experiments and of the papers published by members of the staff during the year. It is noted that the grass plot, which receives a large dressing of nitrate of soda, and has become strongly alkaline, is being overrun by *Lathyrus palustris*. A new line of research regarding the existence and nature of land "sickness" was started, and in connection therewith an examination was begun of the changes taking place in soil when heated to the temperature of boiling water or partially sterilised by treatment with volatile antiseptics. The improvement is apparently due to a re-distribution of the bacterial flora, and partially to chemical change.

AN article is contributed by Dr. H. Marzell to *Naturwissenschaftliche Wochenschrift* (March 14) on the subject of plants which have been popularly endowed with magic qualities. The chief of these is undoubtedly the mandrake, *Mandragora officinalis*, the cultivation of which dates back to very ancient times, and spread from the East to various European countries, so that in the fourteenth century the sale of the roots was interdicted in Paris. Another plant, known as "moly" ($\mu\omega\lambda\upsilon$), frequently mentioned in the classics, because it was given to Ulysses to protect him from the wiles of Circe, is generally regarded as a species of *Allium*. Reference is also made to an old English cantation, "The Song of the Nine Herbs," and to the

superstition connected with "fern seeds," i.e. fern spores, which are supposed to render the bearer invisible.

A PRELIMINARY note by Mr. B. W. Bženov, communicated to the *Bulletin de l'Académie impériale des Sciences de St. Pétersbourg* (series vi., No. 1), furnishes a calendar of algal growth in the bay of Sebastopol. *Ceramium rubrum*, *Cladostephus verticillatus*, species of *Callithamnion* and *Porphyra* persist through the year, but start fresh growth in February. The hot-weather algæ, e.g. *Chondria tenuissima*, *Padina pavonia*, *Dictyota Fasciola*, and *Arthrocladia villosa* appear in April or May, and persist until August or November. *Porphyra leucosticta*, *Scytosiphon lomentarius*, and *Ulothrix implexa* show an active period of growth from November to February, and die down in April. Contrasting these periods with the periods for the same algæ in the Mediterranean, it is found that the seasonal growth generally begins later and sometimes persists longer in the North Sea.

THE prickly pear—a general name for the flat-jointed members of the genus *Opuntia*—is used as cattle food to an increasing extent in certain of the United States, and investigations into its composition have been made at the New Mexico College of Agriculture. Recently (*Bulletin* No. 69) the digestibility by steers was determined, and was found to be not unlike that of ordinary green fodders. The results were:—

Composition Per cent. digestible	Water 83'41	Ether extract 0'31	Protein 0'75	Nitrogen free extract 9'41	Fibre 2'64	Ash 3'48	Total dry matter 16'59
—	67'90	58'25	82'59	41'32	34'68	65'86	

It is stated, however, that the digestibility is increased when prickly pear is fed with other foods.

THE Linnean Society has published a very interesting memento of the Darwin-Wallace celebration held on July 1 of last year. It will be remembered that an account of the proceedings on that occasion appeared in *NATURE* for July 9, 1908. The present volume contains a complete record of the meeting held in the theatre of the Institution of Civil Engineers under the presidency of Dr. D. H. Scott, with full reports of all the speeches then delivered; a list of those present at the dinner given to the medallists and foreign guests; the programme of the reception held at the rooms of the Linnean Society, with an account of the exhibits and lantern demonstrations then shown; the minutes of the meeting held on July 1, 1858, and a reprint of the papers by Darwin and Wallace that were read on that famous occasion, together with the joint letter from Lyell and Hooker by which the communications were introduced. Dr. Wallace himself has contributed to the volume an interesting note, embodying passages from Malthus's "Principles of Population," which illustrate the influence of that work in suggesting the idea of natural selection. Excellent portraits are given of Charles Darwin and of the recipients of the Darwin-Wallace medal, and good reproductions are included of the medal itself and of the beautifully illuminated address presented by the Royal Academy of Science, Stockholm. The whole forms a complete and valuable record of a momentous occasion.

THE *National Geographic Magazine* for February is largely devoted to papers on western Asia, of which the most important is that by Mr. E. Huntingdon on the mountaineers of the Euphrates. The original population of this region consisted of Kurds, who were conquered by

Armenians, and these in their turn by the Turks. The Turks, as a rule, now confine themselves to the richest plains and the cities; but the areas occupied by the three races are not clearly defined, and when they settle in the same village their quarters are separate. The permanent hostility of these peoples is the cause of the present dangerous political situation. The Kurd hates the Turk because he has been often defeated and is rigorously taxed; he despises the Armenian because he is a Christian, and can be ill-treated with impunity whenever the Turk gives permission. The Armenian hates and fears both Kurd and Turk. The Kurd, in fact, is a pagan, with an outward veneer of Islam. The Kuzzilbash, or "red-head" Kurds, of the Dersim district between the two main branches of the Euphrates, are neither good Mohammedans, good Christians, nor good pagans, and another cause of religious animosity is that, being by name of the Shiah sect, they are detested by the Sunni Turks. The illustrations to this paper admirably depict the modes of transit on the Euphrates by means of rafts made of inflated sheepskins. The numerous Hittite inscriptions in this region would attract archæologists if only the new Turkish administration could enforce a semblance of order in this interesting and little-known country.

THE title of a memoir by Mr. Gilbert Walker, F.R.S., on "Correlation in Seasonal Variation of Climate," in vol. xx. of the *Memoirs of the Indian Meteorological Department*, is somewhat misleading, as the present part is of an introductory character only, and is confined to a deduction of the correlation coefficient, the regression equations for two or more variables, and the remaining formulæ of greatest importance in the theory of correlation, on lines that are for the most part simple. The author proceeds by assuming that the departures of one variable, x , are made up of a portion governed by, and a portion independent of, the second variable, y , and that the portion determined by y may be taken as ky if y be small; in order to determine a good value of k , it will be as well to weight each observation equation by the value of its y , as the equations dependent on small values of y are untrustworthy. It will be seen that this amounts to a way of suggesting the formation of the normal equations of the method of least squares.

THE thirty-first annual report of the Deutsche Seewarte, for 1908, like those of all establishments dealing with meteorology, shows increased pressure in various directions. In the department of maritime meteorology the chief events have been the publication of monthly pilot charts of the Indian Ocean (see *NATURE*, February 11, p. 443), and the preparation of an atlas of the currents of Indian, eastern Asiatic, and Australian waters. The number of observers in the mercantile marine cooperating with the Seewarte at the end of the year was about 1000; these receive publications in exchange, and a few medals are awarded annually. In the department of weather telegraphy and storm warnings several improvements have been introduced; the change of hour from 8h. a.m. to 7h. a.m. at British stations has been of great advantage to the German service. Some 6000 storm-warning telegrams were issued during the year, but the percentage of success is not stated. Experiments in the use of wireless telegraphy for weather forecasts have been arranged, with the cooperation of the London Meteorological Office. About 200 kite ascents were made during the year, eighty-six of which exceeded an altitude of 2000 metres; observations with registering balloons have also been regularly made at the times arranged for international ascents. The

discussion of observations at over-sea stations forms an important part of the useful work of the Seewarte; returns from twenty-one places were received, irrespective of the stations in German East Africa, the results for which are being prepared for publication, as in previous years. The departments dealing with the supply and verification of instruments and the preparation of hand-books for seamen also show great activity.

A SIMPLE method of illuminating opaque objects is described by Mr. J. E. Stead, F.R.S., in the *Journal of the Royal Microscopical Society* (February). With low-power objectives a cover-glass is placed at an angle of 45° in front of the objective, and reflects light on to the object from an electric lamp. For higher powers the reflector is always placed in a slit in the objective above the lens.

DR. EMILIO ODDONE, applying the methods of Kovesligethy and Rudsky to the recent Sicilian earthquake, computes the depth of the epicentre at about 9 kilometres. The corresponding result for the Calabrian earthquake of 1905 was 7 km., and the author refers to Mallet's result of 10 km. for the Neapolitan earthquake of 1857, pointing out, however, that other methods lead to much higher values. Dr. Oddone's note is published in the *Atti dei Lincei*, xviii., 4.

In a communication to the *Atti dei Lincei*, xvii. (2), 12, Prof. Augusto Righi integrates, for a particular case, the equations of motion of an electron describing an orbit about an ion in a magnetic field. The case considered is that in which the mass of the ion is so large in comparison with that of the electron that its velocity is practically uniform, and the plane of the orbit is perpendicular to the lines of magnetic force. The problem reduces to a simple one in particle dynamics, and gives for the relative orbit a conic described about the focus. The author discusses the conclusions to be derived regarding the effects of the field in assisting or impeding the separation of the electron from the ion in the case of collisions.

No. 5, vol. xxviii., of the *Astrophysical Journal* contains a paper, by Messrs. G. Duffield and R. Rossi, on the emission spectrum of silver heated in a carbon-tube furnace in air. Previous work by Mr. Duffield having led to the conclusion that a more complete knowledge of the band-spectrum of silver was desirable, the authors employed a similar furnace to that used by Dr. King in his investigations of various spectra at the Pasadena Observatory. The large number of lines observed suggested that the spectrum was not due to silver alone, but comparative experiments with tin and other metals brought out none of the lines. One or two of the flutings observed, in the region λ 5370 to λ 5750, are of doubtful origin, but no opportunity of obtaining definite results presented itself. None of the lines, however, occurs in the arc or in the spark spectrum of silver, although Hartley detected three faint lines in that region of the flame spectrum. The general conclusion is that the oven spectrum of silver differs markedly from the spectra of silver produced by other methods. The experiments were carried out in the physical laboratory of the Manchester University.

Ion for February devotes a dozen pages to a report, by Prof. R. Gans, of the University of Tübingen, on recent advances in ferromagnetism. The subject-matter is arranged under the following heads:—methods of measurement, permeability and hysteresis, influence of frequency, alloys, crystals, influence of temperature, strain and

magnetisation, molecular theories of magnetisation. References to more than 100 papers published during the years 1907-8 are given, and a glance through the list shows that the great bulk of them deal with questions which have arisen in practice, and that very little has been done towards a scientific explanation of magnetic processes. This undue devotion to practical problems the author regrets, and he expresses the view that it is to the interest of all that the purely scientific side of the subject should not be neglected in the quest for material with low hysteresis losses.

No. 43 of the occasional publications of the Conseil international pour l'Exploration de la Mer contains an account of the measurements of the compressibilities of pure water and of sea-water undertaken by Dr. V. W. Ekman, of the central laboratory at Christiania, at the request of the council. The method depends on the measurement of the quantity of mercury forced by pressure into a glass vessel containing the water, through a narrow tube connecting the vessel with another containing mercury and open to the pressure. In the deep-sea instrument the mercury forced in is tilted into a pocket by inclining the vessel. In the laboratory instrument a weighed amount of mercury is placed in the outer vessel, and makes an electric circuit until it is forced past a platinum contact in the narrow tube connecting the two vessels. The compressibility of the glass of the vessels was known, and that of the mercury was found by a separate experiment. The results are given in the form of an expression for the compressibility in terms of temperature and concentration which is valid between 0° C. and 20° C., and up to pressures of 600 atmospheres.

THE new calcium-carbide factory at Odda, on the Søndrefjord, Norway, forms the subject of an interesting article in *Engineering* for March 26. This factory is the property of the Alby United Carbide Factories, Ltd., and has been organised by a British company with British capital in order to ensure a regular supply of calcium carbide, the absence of which was interfering with their business as manufacturers of a special acetylene plant. The potentialities of Norway for industries requiring much power are very great, many waterfalls being splendidly placed for the production of hydraulic power by means of turbo-generators. In the present case, a hydro-electric power installation has been already constructed giving 23,000 E.H.P., and 75,000 to 80,000 horse-power are available in the water supply. The total producing capacity of the new factory is 32,000 tons of calcium carbide and 12,500 tons of nitrolim (for use as a fertiliser) per annum. Care has been taken not to interfere with the amenities of the district, which is a tourist resort. The water-collecting area is 380 square kilometres, from which hundreds of small streams discharge into the Ringedalsvand. As there is only a distance of 3.5 kilometres between this lake and the fjord where the power-station is situated, it will be seen that the conditions are very favourable for the construction of a pipe-line to the power-station.

THE current number of the *Zeitschrift für physikalische Chemie* contains a paper, by J. G. L. Stern, on the application of the platinum resistance thermometer to the determination of molecular weights in fused potassium nitrate as a solvent. The modified form of thermometer used was capable of estimating temperature differences of 0.04° at a temperature of 335° C. The sulphates, chlorides, and nitrates of the alkalis and alkaline earths were used as solutes. The values obtained for potassium nitrite

appeared to show the existence of double molecules; potassium chloride was normal, and sodium, silver, barium, and strontium nitrates were nearly normal, showing a slight dissociation. Sodium chloride behaved as though dissociated into two, barium and strontium chlorides into three parts, whilst the figures for potassium and sodium sulphates were quite abnormal, being split up into more than three parts.

IN response to a widely expressed request, Dr. H. O. Forbes, director of museums and reader in ethnography in the University of Liverpool, has agreed to publish, in book form, the course of lectures recently delivered by him in the Museums Theatre, on "The Reindeer Hunters: the Golden Age of the Cave-dwellers." The volume will be issued in the autumn.

WE have received a copy of the list of publications already issued by the Carnegie Institution of Washington. The list includes particulars of 118 monographs and other works, many of which have been reviewed in NATURE from time to time, and it provides further evidence of the excellent work which the institution is accomplishing in disseminating a knowledge of recent progress in science. The editions of each book are restricted, and as soon as a volume is issued copies of it are sent gratuitously to a limited number of the greater libraries of the world, while the remainder of the edition is placed on sale at a price sufficient only to cover the cost of publication and of carriage to purchasers.

A NEW and revised edition of Prof. W. Bölsche's book, "Haeckel: his Life and Work," has been published by Messrs. Watts and Co. for the Rationalist Press Association, Ltd. The book is published at the price of 6d., and is provided with an introduction and supplementary chapter by the translator, Mr. Joseph McCabe.

MESSRS. CASSELL AND CO., LTD., have commenced the issue, in fortnightly parts, of Prof. Percy Groom's beautifully illustrated "Trees and their Life-histories." The price of each part is 1s. net, and there will be thirteen of them to complete the work. The same firm is issuing Prof. F. E. Hulme's "Familiar Wild Flowers" in fortnightly parts at 6d. net each, and there will be forty-five parts.

A FOURTEENTH edition of Mr. W. T. Lynn's "Remarkable Comets" has been published by Messrs. Samuel Bagster and Sons, Ltd. In this issue, particularly, the author has endeavoured to bring the information carefully up to date. The price of the little book is 6d. net.

OUR ASTRONOMICAL COLUMN.

POSITIONS OF DANIEL'S (1907*d*) AND MOREHOUSE'S (1908*c*) COMETS.—Comet 1907*d* having been observed during the opposition of 1908, Herr H. H. Kritzingen has calculated an ephemeris for the coming opposition, and publishes it in No. 4317 of the *Astronomische Nachrichten*. The ephemeris position for April 16 is 15h. 20·2m., $-7^{\circ} 50'$, and the estimated magnitude is 14·3, but the comet may be as much as 3·8 magnitudes fainter than this. There is just a possibility, however, that it may be re-observed by long-exposure photographs.

An ephemeris for comet 1908*c*, prepared by Dr. Ebell, appears in No. 4309 of the *Astronomische Nachrichten*, and gives the positions and estimated magnitudes of the comet up to the end of June. From this we see that the comet will not rise in these latitudes until about the end of May,

and will then be only about one-third as bright as it was when discovered.

SUN-SPOTS AND SOLAR TEMPERATURE.—In the March number of the *Observatory* Mr. Evershed continues the discussion as to the interpretation of the phenomena of the sun-spot spectrum with regard to temperature. In a previous letter Prof. Whittaker suggested that the tube-furnace phenomena observed by Dr. King might be produced by the direct action of the radiation absorbed from the heated walls of the solid tube rather than in consequence of the collisions between the molecules of the gases themselves. This suggestion Mr. Evershed believes to be unnecessary for the explanation of the radiations observed, and he adduces evidence showing that the molecules of the gases, when excited thermally, are capable, by their mutual collisions at high velocities, of producing the radiations.

In regard to Prof. Whittaker's second suggestion, that the increased intensity of spot lines may be due to enormous pressures obtaining in the lower parts of the chromosphere, Mr. Evershed quotes experimental results showing that such pressures are unnecessary for the production of the intensifications, and then shows that the evidence for the existence of the pressure-differences required by this hypothesis is insufficient. He mentions, parenthetically, that he has observed what appears to be a minute pressure effect on certain lines measured at the sun's limb, and suggests that further observations of this phenomenon may lead to conclusions regarding the various levels at which absorption takes place.

THE APPARENT DISPERSION OF LIGHT IN SPACE.—In an article appearing in the March number of the *Astro-physical Journal* (vol. xxix., No. 2, p. 101) Prof. Lebedew criticises the conclusions arrived at by Belopolsky, Nordmann, and Tikhoff concerning the dispersion of light in interstellar space.

In the first place, he shows that if the delay found by Tikhoff and Nordmann were due to ponderable matter, the absorption produced by such matter would be so great as to render the sun and stars invisible to us. There remains the possibility that the æther itself disperses, without absorbing, light, but this entails an attack on the electromagnetic theories of light, which Prof. Lebedew believes to have been too firmly established, by theory and experiment, to allow of any attack being made simply to explain a series of astronomical observations.

Prof. Lebedew then shows that Tikhoff's assumptions are unsafe, and that his results do not agree sufficiently closely with those of Nordmann to produce conviction, and, finally, he shows that in the case of such systems as those of β Aurigæ and R.T. Persei physical processes sufficient to produce the phenomena observed may be readily conceived.

COLOURED STARS IN THE GLOBULAR CLUSTER M 13.—In the October number of the *Astro-physical Journal* for 1900 Prof. Barnard directed attention to some "abnormal" stars observed by him in the globular cluster M 13 Hercules, such stars being relatively much fainter visually than photographically.

Since the publication of this result he has found other stars of this class in the same cluster, and also in M 5 Libræ. On comparing a photograph of the cluster taken with the Potsdam refractor with one taken with the Yerkes 40-inch refractor fitted with a yellow screen, he was surprised to find that there were many more of these "blue" stars than he had hitherto found; further, a large number of the stars of this cluster must be yellow, for they are relatively much brighter on the Yerkes than on the Potsdam photograph.

Thus, while it is impossible visually to observe any difference in the colours of the stars of M 13, the above comparison shows that great differences of colour, and hence of spectral type, do exist, and Prof. Barnard now gives tables showing which are the blue and which are the yellow stars; he also mentions one or two striking examples of colour-difference, and briefly discusses the variable stars hitherto discovered in this cluster (*Astro-physical Journal*, vol. xxix., No. 1, p. 72).